AI

SMARTSTACK
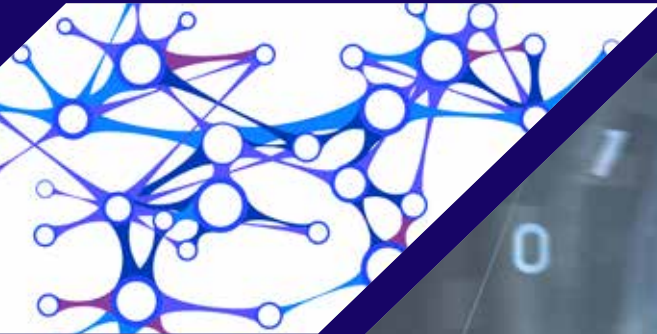**DATA TO INTELLIGENCE**

Artificial Intelligence

4S

Supply & **S**upport
Service **S**ystems Co. Ltd

Advanced Industrial
Automation Services

Artificial Intelligence for Generalists
What AI is and what it isn't.

4S Supply & Support
Service Systems Co. Ltd

Most experts have settled on a short description of AI as being the scientific endeavour of building computer systems that mimic the capabilities of the human brain. No one who fundamentally understands AI is seriously arguing that we can build a computer that can match the intelligence of the human brain in the foreseeable future, if ever. Indeed, we still don't know very much about how the human brain works.

We all know that computers can do some things we humans can't. Computers have beaten world champions of popular games including Chess, Jeopardy and Go. Using facial recognition systems, they can identify a person in fractions of a second.

But the gaming successes are examples of clever techniques rather than intelligent computers. To achieve them, computers need a clever human-made mathematical formula called an algorithm and, often, lots of training managed by humans.

Computers can compare millions of images of human faces at phenomenal speed to seek a match based on the pattern of the pixels in the image, but they probably won't know that what they are identifying is a human being or, indeed, what a human being is.

The ability to do these clever things is through the use of computer techniques broadly known as Machine Learning. So, what is that?

Machine Learning is a technique that is associated with AI. It has been very useful in helping human endeavours in image and sound processing, language translation and trend analysis.

> *" A field of study that gives computers the ability to learn without being explicitly programmed."*
>
> *Arthur Samuel, machine learning pioneer*

It's important to understand that AI is not a single technique or technology.

We are at the beginning of a new era of AI, one that follows a sixty-year history of patchy achievement and predominant failure of many techniques and technologies.

General understanding of what exactly AI is changes every year or so. Three years ago, it was common to hear most "experts" use the term AI interchangeably with Machine Learning, yet the difference has been well understood by real experts for thirty years or more.

As we advance in this AI endeavour, we will learn that true AI will result from the use of many complimentary techniques and technologies, not one or two.

This new phase in the history of AI, facilitated largely by recent substantial progress in delivery of very high computing capacity in Cloud Computing, is expected to finally break through previous technology bottlenecks.

Techniques and technologies that have been well understood for two or three decades can now be usefully applied to intelligently assist human endeavour in everything from autonomous vehicles to medical research.

Companies like PwC, McKinsey, GE, Deloitte and many others forecast economic benefits from adoption of AI to add the equivalent of the US economy to global GDP by 2030, an additional US$15 trillion. So convinced are they of the arrival of this breakthrough in AI capability that they often refer to it in terms such as "the 4th Industrial Revolution", comparable to the previous three centred on Steam, Electricity and Digital Computers.

We are now confident that this new revolution in computing is real, but that we are at the very beginning of it, and we still have a lot to learn.

There is no doubt that AI is an existential threat to industries that don't adapt to new business models powered by new technologies, including AI.

> "According to the Australian Financial Review on December 27, Australia's comparatively wealthy Banks are vulnerable - "by 2030 Millennials will comprise 75% of the workforce. Their expectation of digital service will be set by companies such as Facebook, Amazon, Paypal, Apple or Google, which are all starting to play in financial services, along with masses of specialist fintech start-ups."
>
> Conversely, the "use of artificial intelligence (AI) is quickly expanding within the financial services industry in the US, according to a new report from Broadridge Financial Solutions, a provider of technology to banks, brokers, asset managers, and other businesses. The top motivations or desired outcomes for investing in AI include increased efficiency and productivity, cited by 53%, enhanced data and security (69%), and the ability to redeploy human capital (51%)."

https://www.zdnet.com/article/financial-services-sector-forges-ahead-with-artificial-intelligence

So, what is AI and what is it not?

AI is a huge opportunity and a huge threat to nearly every enterprise, but AI is not a quick solution, a black box that you can buy and switch on for instant success.

AI is not a technology; it is a collection of technologies brought into play as needed.

Of the two major disciplines in AI it is **Knowledge Engineering,** not Machine Learning, that is the most important for true computer intelligence. Clearly, there's a greater benefit in Learning if the computer can store the new knowledge somewhere for knowledge accumulation and later use (sounds a bit like human intelligence, eh?).

In 2019 we have seen the realisation amongst leading experts that a computer cannot have intelligence without it having a Store of knowledge that is understands itself, without human programming.

After thirty frustrating years, Knowledge Engineering is now in its ascendancy. In 2019 we have also acknowledged the great successes of Machine Learning techniques in areas like pattern recognition, but now seen that in the context of its early hype.

Road Ahead

As you do for all software technology adoption, beware the great lock-in.

Use technologies that adhere to international standards ratified by bodies such as W3C. Design and build components that are reusable and able to be integrated across multiple AI applications spanning the enterprise.

AI adoption is a journey, not a quick fix.

Its success is driven by the leadership of a committed executive team, and deployed by internal experts. External expert AI consultants are important in the early stages, but for early guidance and skills transfer only. AI is about improving your business. External consultants are rarely experts on running your business; you and your people are.

You should be at least 80% self-sufficient within a year.

Like all software development don't ever forget that you own it, you can't outsource failure.

Finally, AI is not daunting and can be very successful if you own it, drive it, and get your best people engaged.

Find external expert advisors that don't have an objective of large, multi-year, expensive projects driven by them. If you can do that, you will likely transform your business into something much more effective, with happier customers, and more engaged staff that can escape the mundane tasks to add higher value to the team effort.

Supply and Support Service Systems Ltd (4S) are authorised regional representatives of the Cognitive Software Group, owners of AISmartStack, and have been active in Business Intelligence solutions development since incorporation circa 2008.

AI What we do

General A.I. solutions consultancy and development

Building on a substantial legacy of business intelligence solutions and industrial automation, we offer unique experiences gained in delivering operational excellence and integration of disparate systems found in industrial automation, consultancy in terms of rational application of Cognitive Artificial Intelligence.

Potential Sectors

- Financial
- Governmental
- Engineering
- Manufacturing
- Medical
- Marketing
- Security
- Aerospace
- Many more...

Potential Benefits and Possible Applications

- Government revenue increases – Tax avoidance
- Government expenditure efficiency – exploiting legacy data, targeted expenditure
- Government demographic/social programs – Hidden value (unknown data correlations), data availability
- Patent cross referencing - Search correlations for faster approvals
- Accounting anomaly detection
- Decision Support – context relevant relationships
- Engineering – knowledge maps, real-time data validation
- Manufacturing – Decision Support, situational awareness for operator replacement, continuous operations for 5 years
- Medical – Patient symptom/cause correlation
- Marketing – Improved NLU, realistic responses
- Security – Contextually aware, reduced spoofing
- Aerospace – situational awareness, enhanced autopilot capabilities
- Business Planning - Improved Scheduling
- Just- In-Time Operations

Local Innovation

Developed using AISmartStack workbench, 4S's innovative approach to engineering management and operational awareness to maximise value from the copious amounts of data contained within engineering documentation, while minimizing effort to extract the knowledge, and the elimination of loss, through better informed decisions.

Highlights

- No longer are loop folder contents out of date
- All correlated data/links graphically represented
- NLP searching of knowledge – Instant tag search
- Improved operating margins, reduced lost time
- Uncover unrelated root causes, reducing potential future incidents

Roadmap

Full solutions development covers 3 incremental phases, each building upon the previous phase's accumulation of knowledge.

Industrial Automation – Engineering Conceptual Relationships V3 - Basic
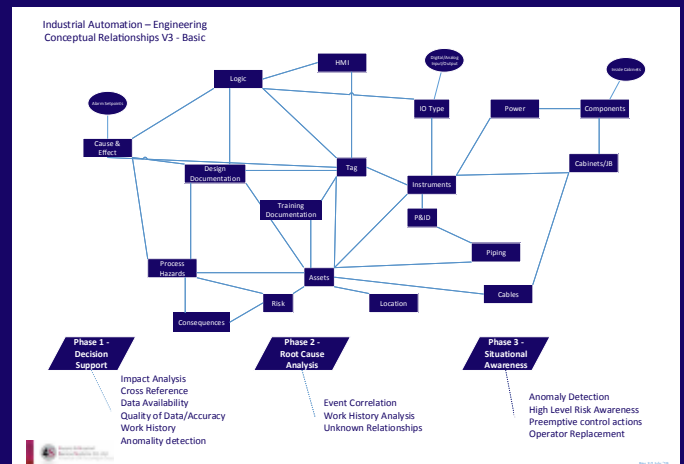
Phase 1 – Decision support system, for the project engineer/stakeholders and plant maintenance personnel to obtain current, pertinent information relating to their task at hand (in a graphical representation); aiding such task as instrument replacement, ensuring users are aware of any implications prior to working, minimizing the likelihood of unintentional lost production. Value – Reduce engineering and construction discrepancies, reducing schedule delays and through reducing lost time production incidents; improved operating margins, reduced lost time.

Phase 2 – Root Cause analysis (RCA), lost time production incidents are investigated to determine root cause analysis, a complex and time-consuming process (anywhere between 8~24 weeks) which typically produces a subjective analysis for corrective actions and consumption in lessons learned. A cognitive approach, building upon the available engineering and process event data already in the system would improve efficacy of identifying potential root causes while also highlighting unrelated potential causes. Value – reduction in hours required to evaluate possible causes, reduce overall RCA publishing process and uncover unrelated root causes, reducing potential future incidents.

Phase 3 – Situational Awareness, AI cognitive comprehension of operational risk and consequences, providing complete plant operation with minimal control room operators. i.e. a plant's 'auto pilot' or a sci-fi favorite "Skynet". Value – Reduce occurrences of plant trips, take preemptive action prior to abnormal situations, minimize control room resources reducing overheads and potentially reach 60 months continuous operations (most plants schedule turnaround activities every 5 years); improved operating margins.

www.aismartstack.com